THE
ONTARIO WATER RESOURCES
COMMISSION

REPORT ON

Water Resources Survey

COUNTY of KENT

BY:

THE COMMISSION

DATE:

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PARLIAMENT BUILDINGS - TORONTO

WATER RESOURCES SURVEY

County of Kent

A survey of water resources
and stream pollution with
recommended programs

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CHAPTER 1

SUMMARY and RECOMMENDATIONS

SUMMARY

This records the results of a preliminary survey of water supply and stream pollution in the County of Kent made by the Ontario Water Resources Commission. Cognizance has been given to the sources of supply, water treatment, distribution and future water requirements of the municipalities. Related to the use of water is the control of stream pollution and its effect on the streams and lakes which are of great importance to the future development of the county. The results of this survey can be summarized as follows:

1 - Almost one half of the population in the county is served by municipal water works systems. A number of municipalities are in need of a municipal system. The growth of these municipalities can be expected to be associated closely with the availability of water.

2 - Kent County has some of the most productive agricultural areas in the province. The future of this industry and that of industries associated with urbanized centres are dependent upon adequate quantities of good quality water for their continued development and welfare.

3 - The demands for water should be carefully studied so that suitable plans can be put into effect well in advance of the actual need. This is especially true of those municipalities situated at some distance from an adequate source of water supply

4 - Geological conditions in many sections of the county are not favourable for the development of ground-water supplies. Almost 25 percent of the wells drilled for water are dry or have an inadequate supply. In those areas where ground water is scarce advantage should be taken wherever possible of surface sources of supply even if at some distance.

5 - Problems of water supply exist at present, or are likely to occur in the future in the following municipalities.

(a) The City of Chatham with almost one quarter of the population of the county will have limitations imposed on its future because of the inferior quality of its present water supply.

(b) The municipalities of Dresden, Ridgetown and Wallaceburg are faced with additions to their water works systems if there should be a significant increase in industrial water requirements.

(c) Four municipalities are in need of water works systems. They are Bothwell, Erieau, Highgate and Thamesville.

6 - Pollution is present in the Thames and Sydenham Rivers in the vicinity of Chatham and Wallaceburg. The contamination of these rivers is due to the discharge of sanitary and industrial wastes. The programme of pollution control has not kept abreast with the need for an improvement in these conditions.

RECOMMENDATIONS

The conclusions and recommendations based on this survey of water needs in the county follow:

1. Immediate consideration should be given to the water needs of the County of Kent in order to insure that adequate supplies of good quality water will be available for its future growth potential.

2. The economics of developing the best source of water supply should be a basis of consideration for supplying water to serve the greatest number of consumers.

3. Action on water supply and pollution programmes in the different municipalities is recommended as follows:

(1) City of Chatham

(a) - the city consider Lake Erie as the future source of water supply for an adequate amount of good quality water.

(b) - the city and surrounding municipalities proceed immediately with the construction of interceptor sewers and sewage treatment works which will control the pollution in the Thames River.

(2) Town of Blenheim

(a) - should the need for more water arise, a survey of wells in the area be made to locate additional ground-water supplies.

(b) - if Lake Erie water becomes available through a pipe line to supply Chatham, that the Town of Blenheim participate in such project.

(c) - a municipal sewage works program be undertaken to correct undesirable pollution in local drainage courses.

(3) Town of Bothwell

(a) - a survey be conducted in the area to determine the availability of ground water to supply a municipal system.

(b) - In the event ground-water supplies are inadequate, consideration be given to obtaining a municipal supply from another source than the Thames River.

(c) - continued supervision be given by local officials and the Kent County Health Unit of septic tank disposal systems serving the municipality.

(4) Town of Dresden

(a) - if additional water is required to serve the town, consideration be given to the development of a well in the deep aquifer that supplies the main well field.

(b) - a municipal sewage works programme be undertaken to include the treatment of all sanitary flows and industrial waste effluents.

(5) Town of Ridgetown

(a) - a detailed survey of ground-water conditions be made to ascertain whether additional municipal supplies are available from this source.

(b) - a study be made of the feasibility of supplying Ridgetown and surrounding areas with Lake Erie water through a pipe line system.

(c) - a municipal sewage works project be undertaken to serve the town.

(6) Town of Tilbury

- a sewage and industrial waste treatment programme be undertaken to control pollution in the Baptiste and Trembley Creeks.

(7) Town of Wallaceburg

(a) - the water works system be expanded to keep pace with the steadily increasing domestic and industrial water requirements.

(b) - the town provide treatment for industrial and sanitary wastes.

(8) Village of Erieau

(a) - a municipal water works system be considered to serve the needs of this community.

(b) - continued supervision be made of private disposal systems for the control of stream pollution in the village.

(9) Village of Erie Beach

- water be obtained from the private well system in instances where shallow wells are contaminated.

(10) Village of Highgate

(a) - a single water works system employing ground water as a source of supply be considered to overcome limitations in water storage and distribution in the existing systems.

(b) - continued supervision be made of private sewage disposal systems to control stream pollution in the village.

(11) Village of Thamesville

(a) - a municipal water works system be constructed to serve the municipality and employing ground water as the source of supply if possible.

(b) - continued supervision be given to septic tank and field tile disposal systems.

(12) Village of Wheatley

- a municipal sewage works project be undertaken to control pollution from domestic and industrial sources.

(13) Townships

(a) - use be made of all available well data and geological information in the development of ground-water supplies.

(b) - in the townships bordering Lakes Erie and St. Clair, these surface supplies of water be utilized where economically feasible.

WATER RESOURCES SURVEY

- COUNTY of KENT -

CHAPTER 2

GEOGRAPHY and GEOLOGY

I. GEOGRAPHY

(1) Topography

There is little variation in relief throughout most of Kent County. The range in elevation is from 572 along the shore of Lake Erie to over 750 feet above sea level near Muirkirk in Orford Township but for the most part the land surface forms a plain between 600 and 625 feet above sea level. The exception is the land area in the eastern part of the county which is influenced by the Blenheim Moraine. This moraine is a glacial land form which is higher than the surrounding country. It enters the county near Muirkirk and extends past Ridgetown almost to Blenheim.

The flat-lying areas are clay, sand or till plains. They owe their existance and shape to the glaciers and the subsequent glacial lakes that covered the area many thousands of years ago. The sand plains and gravel bars and spits that are located in the eastern part of the county and against the Blenheim Moraine were deposited as lacustrine sediments in those ancient glacial lakes. The level till plains are the remains of a more irregular land surface smoothed by waves and currents. Thus the glacial lakes have had a profound effect on the topography of Kent County.

Steep cliffs extend along most of the Lake Erie shore line. They vary in height from over 100 feet near Morpeth to almost lake level at Wheatley. Steeply incised valleys have been eroded back from the face of the bluffs in many places along the shore line. Bars and spits are building up in a few places along the present shoreline such as at Rondeau Park but most of the process is one of erosion.

(2) Drainage

All rivers and creeks of size flow westerly into Lake St. Clair. The Thames River with its tributaries is the most important of these, flowing in a south westerly direction through the centre of the county. The only other river is the Sydenham in the north part of the county flowing in a more westerly course into Lake St. Clair. Streams flowing south into Lake Erie have usually eroded steep valleys a short distance back from the face of the bluffs.

(3) Climate

The climate is moderate with annual average maximum and minimum daily mean temperatures of 58° and 39° Fahrenheit. The extreme highest and lowest temperatures at Chatham over a 43 year period were 97° and -8° respectively.

The annual precipitation averages 29 inches which is distributed fairly evenly over the 12 month period. This precipitation along with plentiful periods of sunshine contributes to an excellent agricultural environment.

(4) Agriculture

Kent County is noted for its agriculture. Ninety percent of the county area is arable.

A variety of crops is grown depending on soil conditions which vary in different parts of the county. Wheat, corn, tobacco and soya beans are the main crops. Sugar beets and tomatoes are grown generally in the western and southwestern parts of the county. Potatoes are more common in the eastern areas.

Specialized vegetable crops have been developed for canning purposes in irrigated and drained areas of Dover and Harwich townships.

(5) Population

The population of the County of Kent in 1957 was 63,549. In 1901 it was 44,490. The variations in rate of increase over the years have been related in part to interest in oil and gas exploration, more specialized agricultural crops and increased industrial activity in the urban areas.

II GEOLOGY

Kent County is covered with a mantle of unconsolidated materials which overlies bedrock formations of the Devonian System.

Black shales of the Kettle point Formation are found beneath the overburden in most of the central and northern parts of the county. Below the black shales are grey shale and argillaceous limestone of the Hamilton Formation which underlie the overburden in the

eastern and western portions except in a few isolated areas where the brown limestone of the lower Delaware Formation is found. The three formations dip gently to the east.

The water-bearing properties of the bedrock formations are generally poor. Small quantities of fresh water are usually obtained in the upper few feet of the formation, but potable water is seldom available in quantity from these formations. Mineralized waters are located at greater depths in the bedrock.

The overburden materials are mostly clay or clay till which is separated by layers of sand in some parts of the county. These sandy formations are usually water bearing but are often so thin or are composed of such fine material that difficulties are encountered in developing water supplies from them. Where the sand and gravel are present directly above the bedrock the development of well water supplies in the county has been most successful.

The lacustrine sand and gravels which are present in the county are of variable thickness and provide water in dug and driven wells.

WATER RESOURCES SURVEY

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CHAPTER 3

The water resources of each municipality are considered separately in the different sections of this report. All aspects of water supply, treatment and pollution are reviewed and recommendations made with regard to future water development and pollution control. The City of Chatham is considered first, followed by the towns, villages and police villages and townships. The location of these in relation to the county are shown in Figure 1.

CITY OF CHATHAM

1. WATER SUPPLY

1. Source

Water for the City of Chatham is obtained from the Thames River. The intake is located approximately one half mile up stream from the city limits. This source in the past has proven to be adequate in quantity but of variable quality.

The river in general is slow moving, warm during the summer and at times contains a high turbidity. In 1957, the turbidity varied from 5.5 ppm. to 625 ppm., and the temperature reached a high of 80°F. In 1954 the turbidity reached a high of 2600 ppm. and a temperature of 83°F. The average hardness of the water is approximately 250ppm. or double that of water from the Great Lakes. In addition to these unsatisfactory natural conditions the river receives pollution from municipalities, industries and agriculture. This type of pollution serves to produce direct tastes and

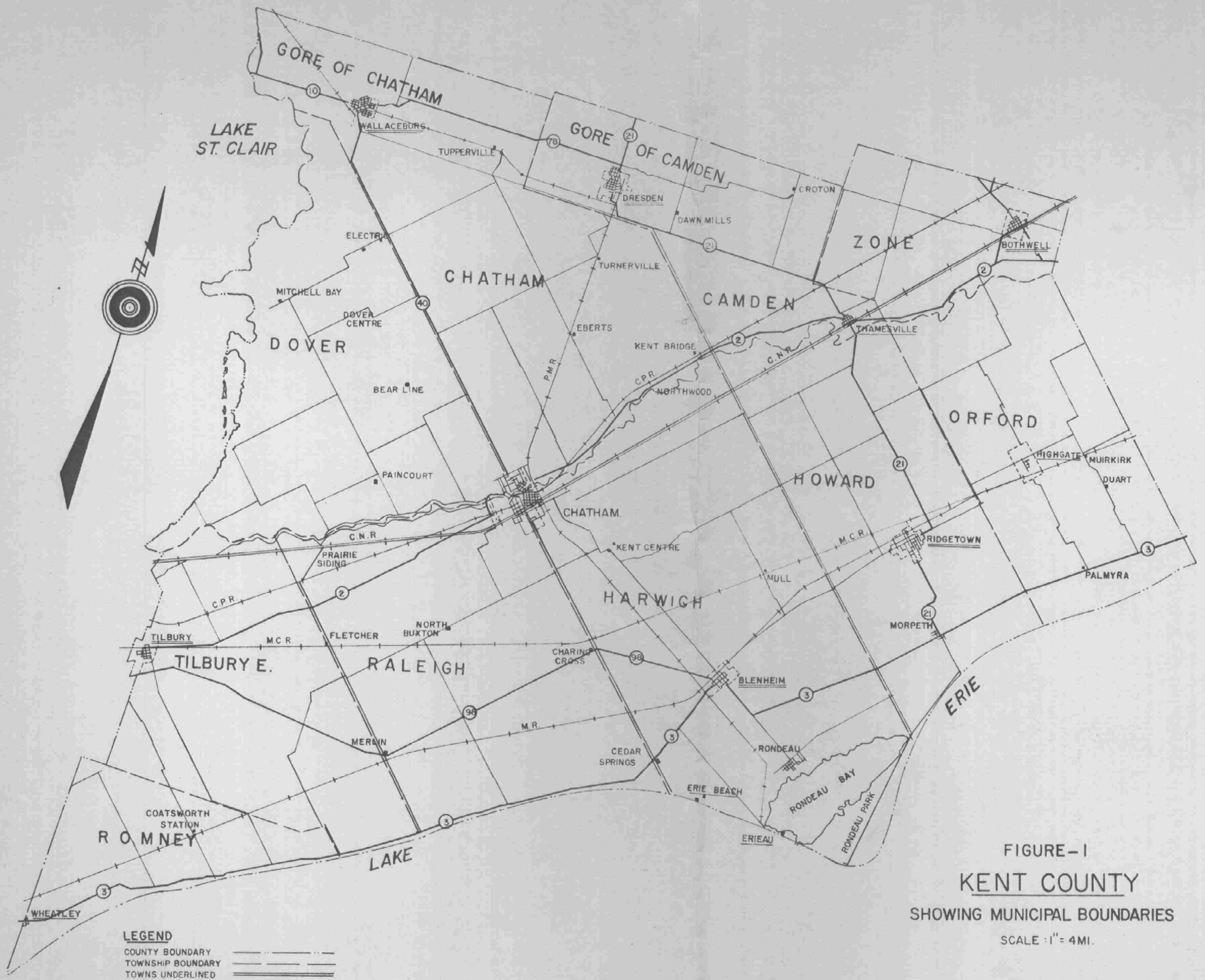

FIGURE-1

KENT COUNTY

SHOWING MUNICIPAL BOUNDARIES

SCALE : 1" = 4MI.

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odours and also enriches the water which subsequently increases undesirable algae and other aquatic growths.

2. Pumpage

The average daily per capita water consumption for 1957 was 135 gallons, a slight decrease from 139 gallons for 1956. There has been a steady increase in total yearly pumpage over the years. For example, in 1936 the pumpage was 775,000,000 gallons compared to 1,649,000,000 gallons in 1957. The following is the record of pumpage for the year 1957:

	Average	Maximum	Minimum	Maximum hourly rate
Gallons daily -	3,765,000	7,645,000	1,730,000	9,576,000
% of Average -	100%	203%	46%	254%

The limiting feature of the existing plant capacity is the low lift pumps. These have a pumpage rate of 7,500,000 gallons daily. As there are no rate controllers on the filters the loading of these is variable and sometimes above the design limit. On the basis of 2 gallons per sq. ft. per min. the filter capacity should be some 5,000,000 gallons daily.

3. Treatment

Treatment consists of chlorination, mixing, flocculation, settling and filtration, During periods of high turbidity it has been necessary to use a system of double coagulation. This was used for nine days during last year.

The greatest consumption of alum occurs during the periods of high turbidity, usually experienced in March and December, whereas the peak chlorine demand is in July when the organic content of the water is high.

The following table lists the amounts of alum and chlorine used in parts per million during 1957.

	Alum	% of Average	Total Chlorine	% of Average
Average	28.8	100%	1.98	100%
Minimum	15.9	65%	1.16	59%
Maximum	37.2	129%	2.93	148%

The large open settling ponds are effective in dealing with the problem of high turbidity. However, they also serve to provide ideal breeding areas for algae and other growths. At times these growths carry over to the filters and produce short filter runs.

Organisms which are killed and allowed to settle in the basins produce troublesome odours and tastes in the water as they putrify. The basins are manually cleaned at intervals. It can therefore be expected that the future production of good quality water will be made more difficult as the organic load of the Thames River increases.

4. Distribution

The distribution system consists of 72.5 miles of pipe with a maximum diameter of 24 inches. At present there are some 7600 services which are 100% metered. There are two underground reservoirs with a total capacity of 900,000 gallons and a recently constructed 750,000 gallon elevated tank. This tank has greatly aided the maintenance of satisfactory pressures throughout the system,

5. Potential Additional Supplies

(a) Surface Waters

There is no stream-gauging station on the Thames River below Byron; however, there appears to be a sufficient supply of

water available in the Thames River in the Chatham area. The undesirable quality of this water suggests that other sources of supply should be considered.

(b) Water Supply from Lake Erie or Lake St. Clair

There are two possible alternative surface supplies, Lake Erie and Lake St. Clair. Chatham is located approximately 12 miles from each lake. From the point of view of potential customers Lake Erie would be the better source, as a pipe line could be placed to pass close to other municipalities such as Erie Beach, Erieau, Rondeau, Blenheim, and the new Ontario Hospital at Cedar Springs.

The records available at the Chatham Water Works indicate that the daily pumpages now average 3.7 m.g.d, with a maximum of 7.6 m.g.d but an hourly peak of 9.5 m.g.d. The design of a plant to provide 15 m.g.d. capacity would be reasonable to satisfy the water requirements for the city of Chatham and other municipalities.

The logical location for the installation of a water works plant to serve this area is west of Cedar Springs, probably in the section adjacent to the new provincial hospital. There is a cliff along the shore of the lake varying in height from 35 to 80 feet. It will therefore be necessary to install a low lift pumping station with shore protection, a filtration plant on the higher land and a supply main to Chatham. Some decision would have to be reached as to what facilities will be retained at the existing city water works plant. It is quite possible that the decision would be that only the present storage and high lift facilities would be continued.

A preliminary estimate of the cost of a pipe line from Lake Erie to Chatham from a site to be located about 3 miles west of Cedar Springs is therefore provided as basis of cost comparison.

Intake - 3000 ft of 42 in. This length of intake should provide water 25 ft. deep.	$300,000
Low lift pumping station with screening and protective work	400,000
15 million gallon per day filtration plant at lake	1,800,000
Supply Main - 63,000 ft. of 30 in. lock joint pipe 150 p.s.i.	1,500,000
Total estimated Cost ..	$4,000,000

II Water Requirements of the Future

It is difficult to forecast the future population of a municipality at any fixed date. However, present general thought indicates that the rate of growth in the next twenty years will be equal to, and most likely be greater than, the past twenty years. The percentage increase in water consumption from 1936 to 1957 was 110%. Therefore, in order to meet quantity requirements for the next 20 years new treatment facilities should be based on at least double the present pumpage.

Good quality water is required for domestic and many industrial purposes. It was previously noted that the Thames River is enriched by industrial and municipal wastes and run-off from agricultural lands which contain considerable amounts of nitrates and phosphates. Increased population with more intensive cultivation of agricultural land will tend to enrich the river and produce greater aquatic plant growths.

Modern day waste-treatment plants do not remove these fertilizing ingredients. Therefore, it will become increasingly more difficult to provide the good quality water necessary for domestic and industrial use. The assurance of an ample supply of such water will continue to attract commercial and industrial consumers to the area.

III Water Pollution

1 Sewage Works

All sanitary sewage at present is carried in separate and combined sewers which eventually discharge in the raw

state at a number of points to the Thames River or its tributaries. The city retained a firm of consulting engineers to report on the problem. This report has recommended a system of interceptor sewers and pumping stations, which will allow all sewage to flow to an eight million gallon per day activated sludge plant. As it would be too costly to separate some of the present combined sewers these sections will be designed to carry five times the dry weather flow. Flows in excess of this will be heavily chlorinated and discharged to the river.

2 Industrial Waste

Industrial waste in the city is handled in a variety of ways. In no case was any of the individual systems satisfactory. In some instances the wastes are discharged untreated to the municipal sewers or through private outlets to the river and in others it receives various degrees of primary treatment.

The following is a summary of the wastes and treatment facilities of industries in the Chatham area which have been inspected in the past.

Campbell Soup Co.Ltd.

This company processes vegetables. During the canning season the average and maximum daily water consumption is 1,500,000 gallons and 1,800,000 gallons respectively.

The waste is treated by means of revolving spray washed screens. The solid portion is hauled away for disposal on land, and the liquid effluent discharges to a municipal sewer.

The following is an analysis of a sample of the screen

effluent taken on September 18,1957.

Solids p.p.m			5 day	Population Equivalent
Total	Susp.	Diss	B.O.D p.p.m	.17 lb. B.O.D./person
472	62	410	140	12,300

Libby McNeil and Libby

The company processes vegetables and during the canning season consumes a daily average and maximum of 1,000,000 gallons and 2,000,000 gallons respectively. All waste is discharged to a mechanically cleaned vibrating screen. The screen effluent is discharged to a municipal sewer. The following is an analysis of the screen effluent which was taken on September 18,1957.

Solids p.p.m			5 day	Population Equivalent
Total	Susp.	Diss.	B.O.D p.p m	.17 lb B.O.D/person
840	338	502	200	11,800

Darling & Co. of Canada Ltd.

This company produces animal by-products and has an estimated average water consumption of 36,000 gallons daily. Treatment is provided by screens, settling, storage basins and recirculation over rock filters. The effluent from the treatment system is discharged to MacGregor's Creek. The following results are averages of a number of samples taken from the treated waste during the period October 19, 1950 to November 11,1953

	Suspended Solids	5 day B.O.D p.p.m	.17 lb.B.O.D./person Population Equivalent
Avg.	680	655	1080
Min.	32	160	270
Max.	4732	2800	4700

The proposed sewage treatment plant will be designed to treat all municipal sanitary sewage and most of the industrial waste. Due to the strong nature of some of the industrial wastes degrees of pre-treatment will be desirable before discharging to the municipal sewers. The degree of pre-treatment required

is a matter for the city officials and its consulting engineers to determine.

3. Thames River

The Thames River and its tributaries in and downstream from Chatham are grossly polluted. This has created an offensive and unhealthy condition in the river which is accentuated in the warm weather and canning season when low flow conditions prevail.

The results of the Thames River Survey carried out during this investigation are shown in the following, Table 1, Figures 2 & 3 ~~which~~ lists the locations of the sampling stations and the analyses.

IV Recommendations for Water Development

Surface Water

Continued use of Thames River water will result in demand for increasing treatment works. It is unlikely that the quality of the river water will improve to the point where it will adequately meet all future demand. Predicted water consumption will require expansion of treatment facilities. It would not be desirable to expand the existing type of filtration plant in future planning.

It is recommended that the City of Chatham consider Lake Erie as the future source of water supply. The assurance of an adequate amount of good quality water at reasonable cost will add greatly to the development potential of the City of Chatham.

V Recommendations for Pollution Control

The results of analyses of river water samples obtained during the survey indicate heavy pollution in the Chatham areas.

TABLE I THAMES RIVER SURVEY — KENT COUNTY

SAMPLING POINT		LOCATION	SOLIDS			5 DAY B.O.D.	COLIFORM IND. Nº
			TOTAL	SUSPENDED	DISSOLVED		
T	0.0	MOUTH OF THAMES R. AT LAKE ST. CLAIR	344	20	324	7.0	10
TBABC	3.7	BIG CREEK AT BRIDGE	480	24	456	17.0	10
TBABT	3.4	TILBURY CR. AT TECUMSEH RD. BRIDGE	444	48	396	9.2	1.000
TBA	2.5	BAPTISTE CR. AT TECUMSEH RD. BRIDGE	464	48	316	13.0	10,000
5		WHEATLEY - AT BRIDGE AND CONCESSION Nº 2	346	20	326	88.0	100.000
6		WHEATLEY - SMALL OPEN DITCH TO STREAM	556	160	396	412.0	100.000
TJ	3.5	JANETTE CR. AT TECUMSEH RD.	500	18	482	3.2	1.000
T	8.8	THAMES R. AT PRAIRIE SIDING BRIDGE	398	26	372	7.0	100
T	12.4	THAMES R. AT NEW BRIDGE BELOW ORCHARD H. STP.	418	26	392	7.4	10.000
T	16.0	THAMES R. BELOW DOMINION SUGAR LAGOON OUTFALL	414	26	388	4.1	100.000
T	18.0	THAMES R. CHATHAM, ABOVE HWY. 2, BELOW MCGREGOR CR.	396	30	366	6.0	100
TM^{C}	18.3	MCGREGOR'S CR. AT THAMES	414	24	390	32.0	10.000
T	18.8	THAMES R. AT WATER PLANT UNDER RWY. BRIDGE	422	60	362	5.6	100
TM^{C}	19.0	MCGREGOR'S CR. AT C.N.R.	710	166	544	360.0	10.000.000
TM^{C}	19.0	" " "	550	48	502	76.0	1.000.000
TM^{C}	20.3	MCGREGOR'S CR. AT MAPLE LEAF CEMETARY BRIDGE	526	54	472	3.8	1.000
T	49.9	THAMES R. AT BORDER OF ELGIN, KENT AND MIDDLESEX CO.	456	48	408	8.3	10
TBO	48.2	CREEK FROM BOTHWELL AT HWY. 2	286	26	260	2.0	10.000
T	46.6	THAMES R. AT INDIAN RESERVE BOUNDARY	346	58	288	7.0	100
T	38.6	THAMES R. AT HWY. 21	338	36	302	9.0	1.000.000
TCO	36.9	CORNWALL CR. AT HWY. 2	490	14	476	606.0	1,000
T	30.5	THAMES R. AT KENT BRIDGE	400	40	360	14.0	100
CHATHAM	23	KEIL DR. AT PARRY BRIDGE	496	18	478	112.0	10.000.000
"	24	MUNICIPAL OUTFALL, THAMES, RICHMOND AND MEREDITH AVES.	1192	553	639	500.0	1.000.000
"	25	SEWER TO MCGREGOR CR. (PARK AND PRINCESS ST.)	550	8	542	224.0	1.000

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This is due to the many sewer outlets which discharge sanitary and industrial contaminants to the river. To return the river to its natural state requires the construction of sewage works in the city and built-up areas.

It is recommended that the City of Chatham and surrounding municipalities proceed immediately with the construction of interceptor sewers and sewage treatment works which will be adequate to provide full treatment of all sewage and wastes and to control the pollution in the Thames River.

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CHAPTER 4

BLENHEIM

TOWNS

I Water Supply

1. Source

Blenheim obtains its water from two well fields. The locations of which are shown on the town plan, Figure 4.

The Knight Field

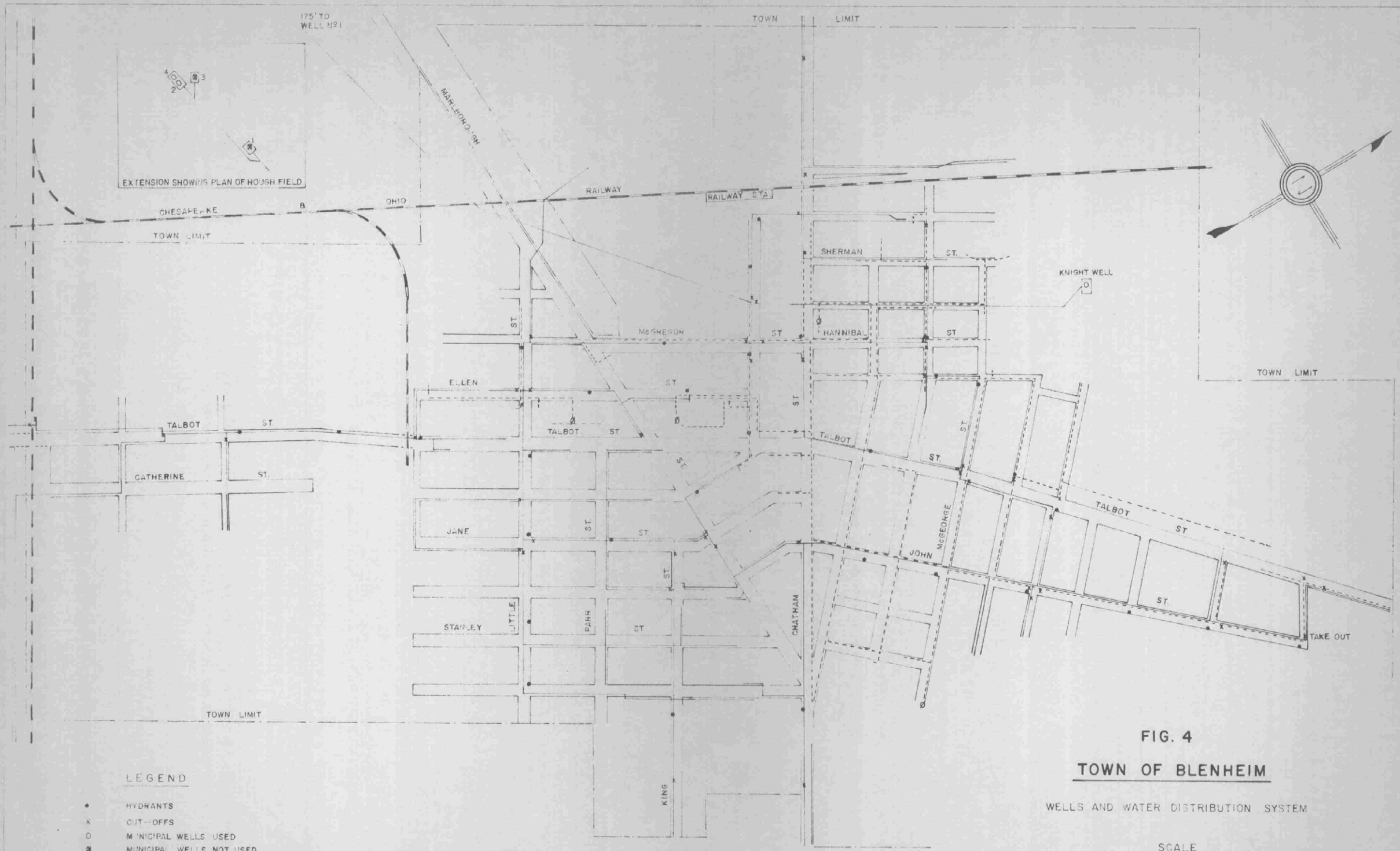
This field, located in the northern section of the town, contains one well referred to as the Knight well. This is a 12 inch well which was drilled into "slate rock" to a depth of 231 feet by Tom Longstreet approximately 20 years ago. The capacity of the well is 150 g.p.m. The static level in 1946 was 129 feet, and it was 133 feet in 1954. The well contains some gas.

The Hough Field

The Hough field contains four wells only two of which, numbers 2 and 4, are now operating. Both contain some gas.

Number 2 Well

This is an 8 inch well which was drilled by Robert Campbell of Ridgetown in 1946. It had a depth of 170 feet and encountered "slate rock" at 155 feet. The aquifer is located within the bedrock at a depth of 163 feet. The well has a capacity of 400 g.p.m. Though Robert Campbell originally pumped it at 450 g.p.m. A pumping test in 1954 was made at the rate of 286 g.p.m with the amount of drawdown unknown. The static level in 1946 was 108 feet. It had fallen to 131 feet by 1956.



LEGEND

- HYDRANTS
- CUT-OFFS
- MUNICIPAL WELLS USED
- MUNICIPAL WELLS NOT USED
- PRIVATE WELLS OF OLD SYSTEM
- MAINS LAYED BY P.U.C.
- FORMERLY PRIVATE MAINS STILL USED

FIG. 4

TOWN OF BLENHEIM

WELLS AND WATER DISTRIBUTION SYSTEM

SCALE

0 4 8 12 16 20 24 28 CHAINS

0 200 600 1000 1400 1800 FEET

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Number 4 Well

This 12 inch well was drilled by International Water Supply Co. to a depth of 170 feet and encountered the same conditions as noted in the number 2 well. The well has a capacity of 450 g.p.m. A pumping test in 1954 indicated 344 g.p.m., though the drawdown is not known. The static level in 1954 was 118 feet but had fallen to 131 feet by 1956.

In 1947 and 1948 two test wells were drilled by R. Campbell, The locations are shown in Figure 3 as numbers 1 and 3. Little information is known on the number 1 test. The number 3 test-drilled to a depth of 161 feet was test-pumped at the rate of 750 g.p.m. but was never placed in service. Difficulties were encountered in installing and operating the pump.

Prior to the present well system, Blenheim obtained its water supply from five private wells. The aquifer is bedrock shale and limestone, described as "slate rock" in the well logs, which was reached at depths ranging from 90 to 170 feet below the ground surface.

2. Pumpage

An electrically driven deep well pump with a capacity of 150 g.p.m. is used at the Knight well, while similar pumps with capacities of 415 g.p.m and 300 g.p.m. are used at numbers 2 and 4 wells respectively.

Water is pumped from the plant on George Street into the mains by means of two electrically driven high lift pumps with capacities of 390 g.p.m. and 325 g.p.m. A larger gasoline driven booster pump with a capacity of 600 g.p.m. is used for stand-by purposes. The estimated consumption is 250,000 gallons per day.

3. Treatment

The well water is pumped directly into the system without treatment.

Crenothrix bacteria are present in the water. This, combined with a corrosive quality in the water, indicates a need for treatment.

4. Distribution

The distribution system consists of six miles of 4 to 8 inch diameter cast iron pipes. Of the 1010 services some 71% are metered. Pressure in the system is stabilized by a 50,000 gallon elevated tank. There is also an 80,000 gallon surface reservoir.

A number of the water mains are old having been taken over by the municipality from private well owners. They are in constant need of repair and provide no adequate means of shut-off for maintenance purposes.

5. Potential Additional Supplies

(a) Ground Water

There is no shortage of water in Blenheim at present, and it appears that the existing system can supply anticipated future demand. It would appear that additional ground-water supplies can be developed in the Blenheim area.

(b) Surface Water

In the event that a pipe line is constructed from Lake Erie to Chatham a three mile feeder line could be laid to serve the Town of Blenheim.

II Water Requirements of the Future

The population in 1957 was 2840, a 25% increase over the previous ten-year period. Plans are being made to annex an additional 132 acres of land which will increase the population by an estimated 500 people.

The present average daily consumption is 250,000 gallons, Taking into consideration an expected 55% increase in population in the next 20 years, and including an anticipated increase due to annexation plans, the estimated average water consumption by 1988 will be approximately 0.5 M.G.D.

It should be kept in mind that the town wells usually operate singly, and until an aquifer test is carried out no definite opinion can be formed of the actual amount of ground water available from the town wells. Although there appears to be an adequate supply of ground water already developed at Blenheim to meet the predicted demand some concern has been expressed by municipal officials with regard to the well supply because of the number of dry holes drilled locally.

III Water Pollution

(a) Sewage Works

All domestic sewage is disposed of by means of private systems such as septic tanks and tile beds. The soil here is generally suitable for the proper functioning of these units. Unfortunately, due to the small size of the lots in the commercial area, many of these systems have been constructed so that they overflow to the municipal storm sewers. This has created objectionable and unhealthy conditions in the drainage ditches which receive the flow from these sewers. As a result there have been complaints from the nearby residents in Norwich Township

(b) Industrial Waste

A canning factory operates within the municipality which discharges treated tomato waste. In any plans for a future municipal sewage-works programme a decision will have to be made on whether this waste will be included.

IV Recommendations for Water Development

(a) Ground Water

Although a sufficient supply of ground water seems to be available in the existing system, should the need for more water arise a survey of wells in the area is recommended to determine the most favourable locations of additional ground-water.

(b) Surface Water

If Lake Erie water is available through a proposed pipe line supply to Chatham, it is recommended that the Town of Blenheim participate in such a project.

V Recommendations for Pollution Control

Investigations have indicated that pollution exists in the main drainage courses in the area. It is recommended that a municipal sewage-works programme be undertaken to correct this undesirable condition. A study should be made of the feasibility of constructing sewage lagoons to treat the sanitary and industrial flows.

BOTHWELL

I 1. Water Supply

(1) Source

There is no municipal domestic water supply works. However, a well and reservoir system has been developed for fire protection purposes. The well is 102 feet deep with a sand and gravel aquifer capable of yielding approximately 45 g.p.m.

Water for domestic purposes is obtained from individual sand points and four drilled wells. Water is obtained in these from both overburden and bedrock aquifers. One deep well has been developed to supply 12 houses.

(2) Distribution

Water is pumped from the well which supplies the fire system into an underground reservoir with a capacity of 80,000 gallons. A 4 inch main distributes water from the reservoir to 13 hydrants located throughout the town.

(3) Potential Additional Supplies

(a) Ground Water

Dry holes have been drilled in the overburden in this area, but water is usually obtained in gravel above or within the bedrock. None of the wells is reported to have a high capacity. A detailed study of the area would therefore be necessary to determine whether or not sufficient ground-water is available to supply a municipal system.

(b) Surface Water

The Thames River is the only surface supply to be considered. It is located about one third of a mile south of the town.

This source of supply was discussed in the Chatham section of this report and the disadvantages of its use outlined.

II Water Requirements of the Future

The 1957 population was 797. This represents a 13% increase in a ten year period. The opinion of the town officials is that the water needs are being adequately met through private water systems at present.

If the population continues to increase it will be necessary to consider a municipal water works system.

III Water Pollution

Private septic tank and field tile disposal systems provide treatment of sanitary sewage.

Experience has shown that the control of pollution where septic tank systems are used is not always satisfactory. The surface water drains in the municipality become contaminated with these discharges. This condition is present to some degree in the Town of Bothwell.

IV Recommendations for Water Development

(a) Ground Water

A need is indicated for a municipal water works system in the Town of Bothwell. A ground-water survey should be conducted in the area to determine the availability of sufficient ground water to supply a municipal system.

(b) Surface Water

In the event that an adequate supply of good quality ground water is unavailable consideration should be given to obtaining a municipal supply from other source than the Thames River.

V Recommendations for Pollution Control

Continued supervision is required by local officials and the Kent County Health Unit of septic tank disposal systems serving the municipality to control the discharge of sanitary waste to surface water drains.

DRESDEN

I Water Supply

(1) Source

(a) Wells

Dresden obtains its ground water from three drilled wells. Two of these were drilled in 1942 and have provided the town with its main supply of water until recent years when falling ground water levels necessitated the use of additional wells and river water to meet the water demand.

The deep wells obtained water from a sand and gravel aquifer at depths of 152 and 160 feet. The shallower well located 80 feet west of the main town well was used for stand-by purposes until recharge operations were undertaken. Artificial recharge has been carried on intermittently in the main well since 1954, and at present the former stand-by well is being used to supply water to the distribution system.

Several shallower wells were drilled to augment the supply from the main deep well. Only one of these, the Davis Street well is operating, and it normally supplies 17,300 g.p.m. to the system.

Water for the artificial recharge operation is obtained from the Sydenham River. It is pumped from a small treatment plant through the town's distribution system into the well.

This operation has not been satisfactory. The rate of recharge has steadily decreased from almost 100 g.p.m in 1954 to 25.g.p.m at present.

(b) Surface Water

In addition to water from wells surface water is obtained from the Sydenham River at two points.

A filtration plant with a capacity of 200 g.p.m was established on the south bank of the river at Peel and Sydenham Streets. This was used to supply the Canadian Canners' plant and the town for municipal and recharge purposes.

In 1958 the OWRC completed the construction of a second plant upstream from the first. It has a capacity of 400 g.p.m.

(2) Pumpage

The filter plant and wells have provided approximately 350,000 g.p.d. to the system. The town's main well has been overpumped for many years resulting in steadily dropping ground water levels. The attempts at artificial recharge have been only partially successful with the result that the amount of water pumped from the main well field has been quite variable.

In the canning season 576,000 g.p.d. is used by the Canadian Canners' plant. This has been provided in part by the filtration plant constructed to augment the well supply. The recently constructed OWRC raw water treatment plant will provide 400 of clarified water of which 200 g.p.m. can be used to supply the town directly with or without filtration.

(3) Treatment

The water from the wells is not treated.

The Sydenham River water has been given treatment by means of alum, filtration and chlorination. The new OCRC plant will provide clarification and softening employing lime, soda ash and alum as raw water conditioners followed by recarbonation and chlorination.

(4) Distribution

The distribution system consists of 35,545 feet of 4 to 8 inch cast iron mains. There are 652 domestic and 111 commercial services. An elevated tank provides 66,000 gallons storage. The system is partially metered.

(5) Potential Additional Supplies

(a) Ground Water

Many test holes which have been drilled in the Dresden area in search of additional ground-water supplies have indicated that this source is limited. Extensions of the main well field have not been located. The amount of ground water still available in the aquifer that supplies these wells is not known. It is possible that properly spaced wells in such an aquifer would supply an additional amount of ground water.

(b) Surface Water

In addition to the Sydenham River which has become the major source of water supply the nearest available surface supply is the Chenal Ecarte. It could be utilized most satisfactorily by means of an extension of a feeder main from the Wallaceburg water system to serve the Town of Dresden.

I Water Requirements of the Future

The population in the Town of Dresden in 1957 was 2216 which was an increase of 13% over the past ten years. Although the population has shown a steady increase in the past the water needs of the municipality have been linked closely with the demand for water by the Canadian Canners' plant. When this plant is in operation it requires more than double the amount of water normally used by the town.

There is a more than adequate amount of water developed at present to meet the needs of the town over the next twenty years exclusive of the Canadian Canners' plant. The future water needs of this company are not known, but any increase over their present requirements will necessitate a review of the town's water-supply capabilities.

III Water Pollution

Septic tanks and field tile systems are employed for sewage disposal in the town. Sewage is being discharged from private homes and business premises into the North Street storm sewer which empties into the Sydenham River. The results of samples taken for bacteriological analyses indicate that pollution exists in the vicinity of the North Street storm sewer outlet.

The industries contributing to the pollution of the Sydenham River are the Canadian Canners' plant and the Dresden Creamery. The Canadian Canners plant utilizes a storm sewer that discharges to the River, and the Dresden Creamery wastes are discharged into the River through the North Street storm sewer.

The amount of pollution in the Sydenham River is significant at any time during the year. When the Canadian Canners plant is operating a large volume of partially treated waste is discharged to the river at a point immediately below the water treatment plants. This contributes greatly to the pollution in the river.

IV Recommendations for Water Development

Ground Water

If additional water is required to serve the Town of Dresden it is recommended that consideration be given to the exploration of a well in the deep aquifer that supplies the main well field. Any new well in this aquifer should be spaced to the north or west of the town sufficiently distant from the town wells to minimize pumping interference. Other than this the river supply can be augmented.

V Recommendation for Pollution Control

Due to serious pollution conditions reported in the Sydenham River in the vicinity of Dresden it is recommended that a municipal sewage works programme be undertaken to include the treatment of all sanitary flows and industrial waste effluents.

In the design of a sewage treatment plant it may be necessary to exclude the industrial waste flow from the Canadian Canners plant because of its volume and strength. In the event that this waste cannot be included in a municipal sewage works programme it will be necessary for the company to provide complete treatment of its wastes.

RIDGETOWN

I Water Supply

(1) Source

Ridgetown obtains its water from two well fields located within the town limits. Both of these fields, the Erie Street and the New York Central were developed more than twenty years ago. Their locations are shown on Figure 5.

The Erie Street field is made up of seven wells all of which are within a radius of 100 feet of the main water works plant. Water is obtained from a sand and gravel aquifer just above the bedrock at depths of 130 to 135 feet.

The New York Central field contains two wells located in a pump house. Water is obtained from the shale bedrock at depths of 150 and 170 feet.

(2) Pumpage

Six wells in the Erie Street field are pumped by means of an air lift with a reported capacity of 200 g.p.m. The seventh well, known as the number 5 well, has a capacity of 200 g.p.m. although when it was drilled it was reported to have a developed capacity of 130 g.p.m. The maximum pumpage is 558,800 g.p.d. The daily average consumption in Ridgetown is 153,586 g.p.d. The maximum daily consumption was 377,000 g.p.d

Two 5 H.P. high-lift pumps with capacities of 250 and 360 g.p.m., along with a stand-by pump of 600 g.p.m. are used to pump water into the mains.

Over the period of 20 years since the wells in the Erie Street field were drilled the average static level has dropped from 50 to 68 feet.

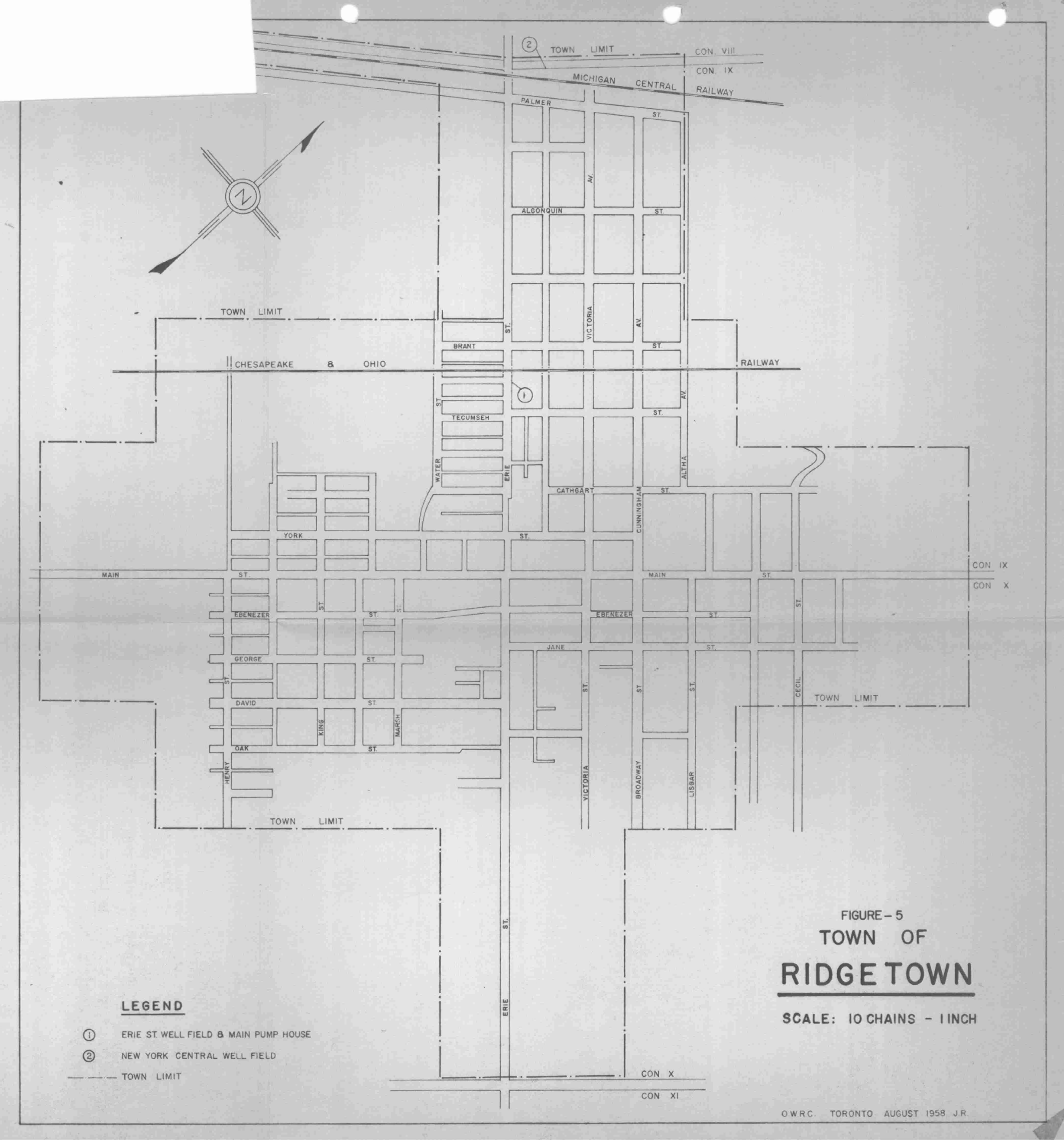

FIGURE – 5

TOWN OF RIDGE TOWN

SCALE: 10 CHAINS - 1 INCH

O.W.R.C. TORONTO AUGUST 1958 J.R.

(3) Treatment

Chlorination treatment is provided. Some further treatment is given through the air lift and piping arrangement between the deep well and the reservoir.

Periodically the Ridgetown water has had unsatisfactory taste, odour and appearance. These periods of unsatisfactory water generally occur during the late summer and early fall. They are due to the bacterial growth which is present in the first section of the old reservoir and is carried over into the pump well.

(4) Distribution

The distribution system includes 5.5.miles of 4 to 8 inch cast iron mains and 2 miles of 1 to 2 inch galvanized iron pipes which provide 815 services. The total reservoir capacity is 230,000 gallons which includes four underground storage compartments and an elevated tank.

The system is being metered at present.

(5) Potential Additional Supplies

(a) Ground Water

Twelve test-holes have been drilled by the town within the last eight years in an effort to locate additional ground-water supplies. The results were inconclusive as only one well was reported to have a capacity favourable for municipal development. It is difficult to say without a detailed survey whether the exploratory drilling to date has adequately tested the area.

(b) Surface Water

Lake Erie provides a potential source of future water supply for the Town of Ridgetown. This source could be developed to serve Ridgetown and surrounding municipalities.

II Water Requirements of the Future

The population has risen from 2209 in 1948 to 2450 in 1957, an increase of 11% in the ten year period. The present water works system is capable of adequately meeting the needs of the estimated future population of Ridgetown during the next twenty years exclusive of the water demand of the Canadian Canners' plant. When this plant is operating it requires in excess of 200,000 gallons per day. This demand, along with domestic consumption cannot be adequately met by the present water system.

Any increase in domestic and industrial consumption in the future will require the development of additional water supply.

III Water Pollution

Domestic sewage is treated by individual septic tank and filter-bed systems. Difficulties have been experienced in the operation of these where insufficient land is used. This has resulted in the pollution of surface water, sewers and drains in the area.

The Canadian Canners' plant which processes a variety of fruit and vegetables provides screening and settling of the waste. This treatment is not adequate, and a strong waste has been discharged to the municipal drain which empties into McGregor Creek.

The town has provided a sewage lagoon for the treatment of waste from the canning factory.

IV Recommendations for Water Development

(a) Ground Water

A detailed survey of ground water conditions should be made in the Ridgetown area to ascertain whether additional municipal supplies are available from this source.

(b) Surface Water

A substantial increase in the supply of water needed for industrial purposes is indicated in Ridgetown. In view of this, it is recommended that a study be made of the feasibility of supplying Ridgetown and surrounding areas with Lake Erie water through a pipe line system.

V Recommendations for Pollution Control

It is recommended that municipal sewage works be undertaken to serve the town of Ridgetown. Sewage treatment works, lagoon-type, appear to be practical provided the design is adequate to meet the large volume and high B.O.D. strength of the Canadian Canners' waste.

TILBURY

I Water Supply

(1) Source

Water is obtained from Lake St. Clair, The 16 inch intake is located 3217 feet from shore at a depth of 10 feet.

(2) Pumpage

The capacity of the water works plant is 1,528,000 g.p.d over which is the rated capacity of the pressure filters.

The average daily consumption has decreased from 710,000 to 420,000 g.p.d. over the last ten years. The maximum daily consumption in 1957 was 550,000 gallons.

(3) Treatment

The treatment consists of coagulation and settling followed by filtration. Alum is applied to the raw water preceding flocculation and settling in the Dorr Hydro-treator unit. The water is filtered through four pressure filters with a total capacity of 1,528,000 g.p.d. Chlorine is applied to the water at a point between the Hydro-treator and the filters maintaining a chlorine residual to the distribution system.

(4) Distribution

The distribution system contains 24 miles of 4 to 16 inch cast iron pipe. There are 1,053 services on the system. An elevated tank with a capacity of 330,000 gallons provides a pressure of 55 p.s.i. throughout the system.

(5) Potential Additional Supplies

Ground Water

Records of water wells in the Tilbury area show that an adequate supply of good quality ground water is lacking. The mineral content of many of the bedrock wells is high. The overburden is mostly clay, and when water is present the thin sand aquifer overlying the bedrock it is usually in limited quantities.

II Water Requirements of the Future

The population has remained steady over the past five years at 3030. Industrial use of water is declining which will make additional water available for domestic purposes. The present capacity of the water works system is quite adequate to meet anticipated population demands over the next twenty years.

III Water Pollution

A combined sewer system receives both sanitary and surface water flows. These wastes receive no treatment and are discharged into Baptiste Creek.

Industrial wastes from the Canadian Canners and Hunts Food plants discharge partially treated wastes to adjacent watercourses.

Investigations of Baptiste and Trembley Creeks have indicated that they are being polluted. Maximum pollution conditions exist during the canning season.

IV Recommendations for Water Development

The existing water works system serving the Town of Tilbury is adequate for present and future requirements. It is recommended that the municipality continue to use Lake St.Clair as a source of water supply.

V Recommendations for Pollution Control

The high degree of contamination in waters receiving waste from the Tilbury area is sufficiently serious to require the construction of sewage treatment works. The treatment of industrial waste effluents can be provided by the respective industries.

It is recommended that a sewage and industrial waste treatment programme be undertaken to control pollution in Baptiste and Trembley Creeks.

WALLACEBURG

I Water Supply

(1) Source

The source of water supply for Wallaceburg is the Chenol Ecarte a branch of the St. Clair River. The water is pumped approximately four miles to the filtration plant for treatment.

(2) Pumpage

The filtration plant can provide raw water treatment of 5,000,000 g.p.d. and 3,000,000 g.p.d of filtered water. Unfiltered water is pumped directly to the Libby McNeil and Libby canning factory.

The daily average water consumption has increased from 1.0 to 1.7 M.G.D. in the last ten years. The maximum daily pumpage in 1957 was 2,100,000 gallons.

(3) Treatment

Water treatment consists of the addition of alum, coagulation, settling and filtration. Chlorine dioxide treatment is given to the raw and filtered waters for the control of phenolic tastes.

The four mechanical gravity filters have a rated capacity of 3 M.G.D.

The quality of the raw water varies throughout the seasons. In the late fall and the early winter algae is present. Turbidity conditions occur during the spring run-off. Although Phenols have not occurred in large quantities during the past two years, some was present during the winter of 1957-58

(4) Distribution

The distribution system consists of 26½ miles of cast iron pipe ranging in diameter from 4 to 14 inches and 1½ miles of 6 to 16 inch asbestos-cement pipe. There are 2610 services on the system.

Storage is provided by a 400,000 gallon ground level reservoir at the filter plant and a 160,000 gallon standpipe in the town.

(5) Potential Additional Supplies

The present source of water supply serving Wallaceburg is adequate for any anticipated future demand. It will be necessary only to enlarge the existing system.

II Water Requirements of the Future

The present population of 7907 represents a 14% increase in the last 10 years. A request for annexation of 940 acres from Chatham Township has been submitted to the Ontario Municipal Board. The majority of the 1500 inhabitants who reside in this area are presently supplied with water from the Wallaceburg system.

It is expected that water in excess of 3 M.G.D. will be needed during the peak demand periods in the near future. To meet this demand it will be necessary to enlarge the filter plant capacity and to add a second feeder main from the plant to the town.

III Water Pollution

There is no municipal sewage treatment plant in the Town of Wallaceburg. A combined sewer system serves the built-up areas with outlets at the Sydenham River.

Analyses of bacteriological and chemical samples taken from the river indicate that the pollution level in this river and its branches is quite high, as shown in Figure 6 and Table 2.

IV Recommendations for Water Development

It will be necessary for the town to expand the water system to keep pace with the steadily increasing domestic and industrial water requirements.

V Recommendations for Pollution Control

It is necessary to control the amount of pollution reaching the Sydenham River through the discharge of untreated domestic and industrial wastes at the municipal sewer outlets.

It is therefore recommended that the Town of Wallaceburg provide sewage treatment facilities. If the treatment of industrial wastes cannot be included in the municipal project, the industries concerned would be required to provide separate treatment facilities.

TABLE 2 SYDENHAM RIVER SURVEY —— KENT COUNTY

SAMPLING POINT	LOCATION	COLIFORM IND. Nº
	EAST BRANCH	
SY 1.4	WALLECEBURG AT S.W. LIMITS OF TOWN	10000000
SY 1.6	" " AT ST. CLAIR GRAIN ELEVATOR	100000
SY 2.0	" " FROM CANADA AND DOMINION SUGAR CO. DRAIN OUTFALL	10000000
SY 2.1	" " AT " " "	10000000
SY 2.2	" " AT SYDENHAM TRADING CO.	10000
SY 2.3	" " AT HURON ST.	1000
SY 2.9	" " AT GREEK ST.	1000
SY 3.0	" " AT LORD SELKIRK BRIDGE, DUNCAN ST.	10000
SY 3.2	" " AT MURRAY ST.	100000
SY 3.6	" " AT BRIDGE NEAR EAST LIMITS	1000
	NORTH BRANCH	
SYN 3.4	WALLECEBURG AT ELIZABETH ST.	10000
SYN. 3.7	" " OPPOSITE OTTER CREEK	1000
SYN. 4.1	" " AT GRAND AV.	1000
	EAST BRANCH	
SY 15.0	DRESDEN NEAR HOLDEN ST., JUST BELOW DRESDEN	1000
SY 15.6	" AT BRIDGE HWY 21	10000
SY 16.3	" 1/2 MILE BELOW JUNCTION WITH MOLLY CREEK, EAST OF DRESDEN	1000

NOTE: THESE RESULTS WERE OBTAINED FROM THE REPORT "SURVEY OF SYDENHAM RIVER, EAST BRANCH" DATED OCTOBER 28-31, 1957

O.W.R.C. TORONTO AUGUST 1958 J.R.

WATER RESOURCES SURVEY

- COUNTY of KENT -

CHAPTER 5

VILLAGES

ERIEAU

I Water Supply

(1) Source

Wells

There is no municipal water works system. Water in the village is obtained mostly from individual sand points set in a horizon of sand which varies in depth along the length of the bar on which the village is located.

Two drilled wells in the village obtained good supplies of water from the overburden at depths of 108 and 112 feet.

(2) Potential Additional Supplies

(a) Ground Water

It is likely that additional ground water supplies are available at Erieau. A detailed study which would include test drilling would be necessary to determine the extent and yield of the underlying aquifers.

(b) Surface Water

The Village of Erieau is situated on Lake Erie. This source of water supply is readily available for the development of a public system.

II Water Requirements of the Future

The year round population of 465 increases to over 600 in the summer months. A dry dock, a coal yard and a fishing

industry are located in the village. Although ample water appears to be available, the quality of the water from sand points is not always satisfactory. A 36% increase in the permanent population over the past 10 years along with the substantial increase during the summer season would indicate the need for a municipal water worksprogramme.

III Water Pollution

It has been reported that a number of shallow sand point wells have been contaminated by discharges of sanitary wastes from septic tank and field tile systems. This situation has developed as a result of shallow wells and disposal systems being located on the same small sized lots in the village.

IV Recommendations for Water Development

A municipal water works system is recommended to serve the future needs of this expanding community. The instances of pollution in a number of the private water supplies make this especially desirable. Both ground and surface waters might be considered as sources of supply. An engineering report is necessary to determine which source is feasible.

V Recommendations for Pollution Control

Continued supervision of private disposal systems is necessary for the control of pollution in the village.

ERIE BEACH

I Water Supply

(1) Source

A private water system has been developed to supply a number of residences in the village. The remainder of the village is supplied from individual wells most of which are shallow.

The well which supplies the private system was drilled in 1957 and is owned by J. Flemming and A. Pegg of Blenheim. Water is obtained from a sand and gravel aquifer at a depth of 109 feet. A second well with a capacity of 8.3 g.p.m. is available for a reserve supply.

(2) Pumpage

The private well has been test-pumped at a rate of 25 g.p.m. The capacity of the deep-well pump installed in this well is 30 g.p.m. The high-lift pump supplying the system from the reservoir has a capacity of 125 g.p.m.

(3) Treatment

The well water is not treated, but gas is encountered occasionally.

(4) Distribution

Water is pumped from the well into a 1000 gallon pressure tank. The distribution consists of $1\frac{1}{2}$, $2\frac{1}{2}$ and 3 inch mains.

(5) Potential Additional Supplies

(a) Ground Water

Available information indicates that the ground-water supply is adequate for the present and, possibly the future needs of the village. The private well has never been adequately test-pumped and appears to be capable of supplying considerably more water than is required at present.

(b) Surface Water

The village is situated on Lake Erie which is readily available as a source of abundant water supply.

II Water Requirements of the Future

The permanent population of 97 represents almonst 100% increase in the previous ten year period. The summer population increases to 300.

The present water systems are sufficient to meet the needs of the village now and over the next 20 year period.

III Water Pollution

Individual septic tank and field tile systems serve the village of Erie Beach. These function satisfactorily in the light soil of the area. Some contamination of shallow wells has been reported where both systems are located on a single lot.

IV Recommendations for Water Development

Ground Water

If an expansion of the community requires water in excess of the capabilities of the present wells it is likely that additional wells can be developed.

V Recommendations for Pollution Control

In those instances where contamination of shallow wells has occurred it is recommended that the water supply be obtained from the private system.

HIGHGATE

I Water Supply

(1) Source

Highgate obtains its water from five private wells which were drilled more than ten years ago to depths ranging from 140 to 211 feet. The aquifers are located in both the overburden and bedrock formations.

(2) Pumpage

Low capacity pumps have been installed in the five private wells. The maximum pump capacity does not exceed 40 g.p.m.

(3) Treatment

The well water supplies are not treated.

(4) Distribution

Each private well owner has his own distribution system serving in all 72 consumers. Eight storage reservoirs provide a total capacity of 2880 gallons. The distribution systems use galvanized iron pipe with a maximum diameter of 1¼ inches.

(5) Potential Additional Supplies

Ground Water

Local wells indicate that aquifers exist in both the overburden and bedrock formations which might provide additional quantities of ground water in the Highgate area.

II Water Requirements of the Future

The population of Highgate was 367 in 1957 which was 27 more than the population in 1947. This represents only a moderate increase in the ten year period and there is no indication that the trend will change in the immediate future.

Not all the people in the village obtain water from the present systems. Complaints of shortages have been received from some of the consumers. The problem is related to the development of the storage and distribution rather than to the source of supply. Although the present wells are operating near capacity, unused wells are available to supplement the present supply.

III Water Pollution

Septic tank and field tile systems provide treatment of sewage wastes from private homes. Surface water drains in the village receive some sanitary waste. This condition becomes more acute in warm weather periods.

IV Recommended Water Development

The problem of water supply in the Village of Highgate is due to limitations in water storage and distribution. This could be overcome by the construction of a single water works system employing ground water as the source.

V Recommendations for Pollution Control

Continued supervision by local authorities of septic tank and field tile systems in the Village is required to prevent pollution.

THAMESVILLE

I Water Supply

(1) Source

(a) Ground Water

Water is obtained for domestic purposes from shallow dug wells and sand points. Well depths range from 10 to 20 feet.

(b) Surface Water

The municipal water system is supplied by a non-potable supply obtained from Cornwall Creek. Its main purpose is for fire protection. This is a low flow stream which is contaminated by private sewage discharges in the surrounding area.

(2) Pumpage

There are no meters on the system and no records of daily consumption. The total pump capacity on the system is 454 g.p.m.

(3) Distribution

In 1953 the distribution system consisted of 6,450 feet of 4 to 8 inch cast iron mains. Since that time extensions have been added to the mains. More than 300 connections have been made to the system. Storage of water is provided by an elevated tank having a capacity of 54,000 gallons.

(4) Potential Additional Supplies

(a) Ground Water

In 1953 a report by V.M. Veitch, Consulting Engineer, recommended the development of a municipal water works system from shallow wells. Subsequent test-drilling was undertaken, the results of which were not reported.

Although well records indicate that a supply of ground water in the Thamesville area in sufficient quantity to meet the needs of the village is questionable, a detailed survey is necessary to appraise ground-water conditions.

(b) Surface Water

The Thames River which flows through the village is a potential source of water supply. The disadvantages of this supply were discussed under the Chatham section of this report.

Two excavations located 1½ miles northeast of the village which were used for construction purposes are filled with water. At the present time these are being considered by the village officials as a source of municipal supply.

II Water Requirements of the Future

The population in Thamesville in 1957 was 1040, a 21% increase over the previous 10 year period. In 1953 V.M.Veitch estimated the water requirements for the village to be

100,000 g.p.d. This is expected to increase to 150,000 g.p.d in the next twenty years.

III Water Pollution

Domestic sewage is treated by means of private septic tank and field tile systems.

Some pollution exists in the surface water drains and streams in the vicinity of Thamesville. The sample taken at Cornwall Creek during this investigation did not show heavy pollution. However, samples taken on previous occasions indicated that sewage was present in the stream.

IV Recommended Water Development

A municipal water works system is needed in Thamesville.

It is recommended that a detailed study be made of ground-water conditions in the area to determine the availability of sufficient supply of water from this source for a municipal system.

If ground water supplies prove to be inadequate, the Thames River or an extention from a possible future pipe line system from Lake Erie would be the only alternative source of supply.

V Recommendations for Pollution Control

Continued supervision should be given to septic tank and field tile systems employed for sewage treatment.

WHEATLEY

I Water Supply

(1) Source

Lake Erie is the source of water supply for the village of Wheatley.

(2) Pumpage

In 1957 the average daily pumpage was 226,000 gallons, and the maximum pumpage was 330,000 gallons. The maximum pumpage for a day occurred in 1955 and was 590,000 gallons.

The average daily pumpage has increased by 59,000 gallons since 1950.

(3) Treatment

The treatment plant provides for mixing, coagulation, settling and filtration. Alum is applied to the raw water and chlorine to the filtered water. There are no particular treatment problems with this water.

(4) Distribution

The distribution system consists of 8½ miles of cast iron pipe varying in size from 4 to 8 inches. There are 560 services, 90% of which are metered.

In addition to supplying the village, water is pumped to Olmstead Fisheries, Ltd. and some residences in the adjacent township areas. The pressure throughout the system has been adequate in the past.

II Water Requirements of the Future

The present population is 1232. This represents a 27% increase over the previous ten year period.

The present maximum pumpage rate of the plant is 1 M.G.D., however, the rated capacity of the filters of 750,000 g.p.d. is the limiting capacity of the plant. This capacity is ample for present requirements and should meet the demand for at least the next 20 years.

III Water Pollution

The domestic sewage in the village is discharged to private disposal systems. These consist of septic tanks, field tiles and some leaching pits. The soil in the area is heavy clay and as a result the disposal systems overflow into surface water ditches and sewers.

Industrial waste in this area is from two main sources and receives varying degrees of treatment.

Niagara Food Products, Ltd.

This plant is engaged in processing fruits and vegetables and during the canning season consumes an average of 95,000 gallons daily. The waste passes through rotary screens and is then discharged to a storage lagoon. The waste is released from the lagoon at intervals during periods of high flow in the receiving creek. This system has been satisfactory when discretion is used in selecting periods of release.

Olmstead Fisheries, Ltd.

This plant is a fish packing establishment and has an estimated daily water consumption during periods of peak production of 900,000 gallons. All floor waste is discharged to a collecting pit and pumped to a vibrating screen. The liquid effluent from the screen drains to the Wheatley harbour.

The following analysis of the screened effluent was obtained from a sample taken on September 17, 1957.

Solids p.p.m.			5 Day	Population Equivalent
Total	Susp.	Diss	B.O.D. p.p.m	.17 lb. B.O.D./person
1992	1178	814	1042	55,000

Samples collected from ditches in Wheatley showed gross pollution. Sample #6 which was from an open ditch had a 5 Day B.O.D. of 412 p.p.m. There was visual evidence of domestic

sanitary waste in this ditch. Sample #5 was taken from a small stream which flowed close to a refuse dump. It is possible that the pollution in this case was due to drainage from the refuse.

IV Recommendations for Water Development

Surface Water

The present source and location should be adequate to meet future water needs.

V Recommendations for Pollution Control

The adverse soil conditions for septic tank and field tile systems indicate the need for municipal sewage works.

The treatment of industrial wastes should be considered with a municipal sewage works programme. In the event that the volume and strength of these wastes cannot be included in such a programme treatment will be required by each industry.

WATER RESOURCES SURVEY

- COUNTY of KENT -

CHAPTER 6

- TOWNSHIPS -

I Water Supply

Well water is obtained from two main aquifers, a thin sand and gravel layer at the base of the overburden and the upper few feet of the bedrock formations. The sand and gravel layer is the better aquifer. It has a maximum thickness of 15 feet which occurs in the townships in the southeast part of the county. This formation becomes thin and patchy elsewhere in the county. The shales and limestone which underlie the drift generally yield small amounts of water in the upper few feet of the formations.

In a number of township areas where the sand and gravel aquifer is thin or fine grained and the underlying bedrock is not water-bearing serious water-supply problems occur. Frequently many dry holes have to be drilled on a single farm before locating a suitable water supply. Almost 25% of the wells drilled in the county are dry or have to be abandoned because of insufficient water.

In the sand plain areas in the northeast section of the county sand points are frequently employed to obtain water at relatively shallow depths. This type of well is used also in a few other areas, such as Rondeay Bay where sand and gravel accumulation makes this type of well construction easible.

The water is mostly of good quality. Some mineralized water is encountered in the bedrock wells particularly in the townships where the oil and gas fields are located. Natural gas

occurs sometimes with the well water.

II Water Pollution

Most of the domestic sanitary sewage in the rural areas is disposed of by individual septic tank and field tile beds. In many parts of the county a heavy soil condition exists which is unsuitable for this type of system. In the more populated sections of the town ships wastes are discharged to surface water drains. This subsequently produces undesirable conditions in the receiving waters. This is especially acute in the township areas bordering the municipalities of Chatham and Wallaceburg.

III Recommendations for Water Development

In the township areas where water development from ground-water sources is being considered, use should be made of all available well data and geological information. In the townships bordering Lake Erie and Lake St. Clair surface supplies of water are readily available and can be utilized where it is economically feasible.

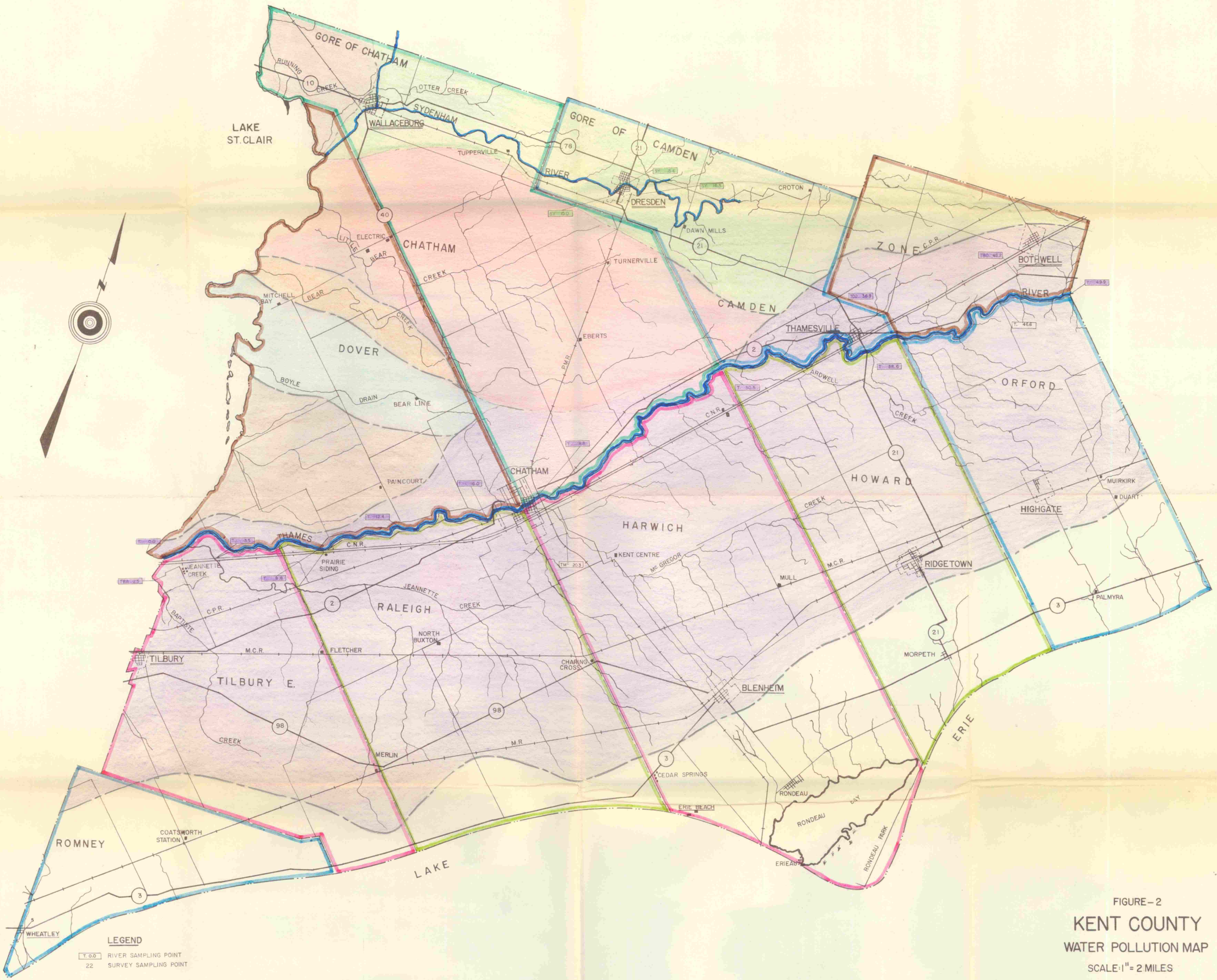

FIGURE – 2

KENT COUNTY

WATER POLLUTION MAP

SCALE: 1" = 2 MILES

O.W.R.C. TORONTO JULY 1958 H.E.

LEGEND

TMC 19 0 — RIVER SAMPLING POINTS

23 — SEWER EFFLUENT

FIGURE – 3

CITY OF

CHATHAM

KENT COUNTY

SANITARY SURVEY

SCALE: 1" = 1000'

OWRC. JULY 1958. J.H.

GORE OF CHATHAM

N

C.B.Q. RYS.

RUNNING CREEK

HIGHWAY 40

TURNBULL AV.

GLASS ST.

GARNET ST.

DUFFERIN AV.

ELGIN ST.

ELIZABETH ST.

FORHAN ST.

RUNNING CREEK DR.

DUNCAN CREEK

MESSON ST.

CAMP ST.

JAMES ST.

LAFONTAINE ST.

NORTH BRANCH

BRAND AVE.

WATER ST.

SYN 4-1

SYN 3-7

OTTER CREEK

DURACHROME CO.

SY 3-4

PARK ST.

SY 3-2

MARGARET AV.

SY 3-6

LAWRENCE AV.

HIGHWAY 78

HOSPITAL SITE

EAST BRANCH

WALLACE ST.

KING ST.

SY 3-0

QUEEN ST.

SY 2-9

DUKE ST.

RIVER ST.

SYDENHAM ST.

GILLARD

GORDEN PARK

MURRAY

ALBERT ST.

MC LAUGHTON ST.

C.B.Q. RYS.

DOMINION GLASS CO.

SY 2-3

WALLACE

HURON ST.

SY 2-2

SY 2-1

SYDENHAM TRADING CO.

CANADA & DOMINION SUGAR CO.

SEWAGE PUMPING STATION

MASON ST.

SY 2-0

DOMINION DIE CASTING

LIBBY ST.

LIBBY Mc NEIL & LIBBY

WATER WORKS

SYN 1-6

ST CLAIRE GRAIN ELEVATOR

SY 1-4

Mc DONALD TAP-URBAN

LEGEND

SY. 1-9 – SAMPLING POINT SHOWING STREAM & MILEAGE

SY. 2-0 – STREAM AND MILEAGE AT OUTFALL
I – TYPE OF OUTFALL
I – INDUSTRIAL POLLUTION

----- – SEWER

GORE OF CHATHAM

FIGURE–6

TOWN OF

WALLACEBURG

SANITARY SURVEY

SCALE OF FEET

600 400 200 0 1000 2000

1 INCH = 600 FEET

O.W.R.C. TORONTO JULY 1958 J.R.